WHAT IS CLAIMED IS:

1. A manufacturing method of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, wherein

a minute metallic sphere is formed by injecting a molten metal in a gauger of a predetermined volume to measure, and discharging the measured molten metal from the gauger to solidify.

2. A manufacturing method of minute metallic spheres described in claim 1, wherein

said molten metal discharged from said gauger is cooled to a temperature less than the melting point, and solidified into a sphere in the cooling process.

3. A manufacturing method of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, including

a step of heating and melting a metal to form a metallic sphere, and injecting the molten metal in a gauger,

a step of taking by rubbing the molten metal injected in said gauger by a predetermined volume to measure, and

a step of discharging the measured molten metal from the gauger, and cooling the molten metal to a temperature less than the melting point to solidify.

4. A manufacturing method of minute metallic spheres described in claim 3, wherein

the molten metal injected in said gauger is cut by rubbing by the predetermined volume by rotational or slide action of said gauger to measure.

5. A manufacturing method of minute metallic spheres described in claim 1, wherein

the molten metal in said gauger is discharged in a fluid at a temperature less than the melting point.

6. A manufacturing method of minute metallic spheres described in claim 5, wherein

said fluid is an oil or an inert high-molecular liquid or an inert high-molecular steam or an inert gas.

7. A manufacturing method of minute metallic spheres described in claim 1, wherein

said molten metal is pressurized and filled when said molten metal is injected in said gauger.

8. A manufacturing apparatus of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, comprising

a heating means for heating and melting a metal to form a metallic sphere,

a measurement means for measuring the injected molten metal into a predetermined volume, and

a cooling means for cooling said molten metal discharged from said gauger, to a temperature less than the melting point.

9. A manufacturing apparatus of minute metallic spheres described in claim 8, wherein

said measurement means has a gauger of a predetermined volume in which the molten metal is injected, and is constructed such that said molten metal is cut by rubbing by the predetermined volume by sliding this gauger in contact.

10. A manufacturing apparatus of minute metallic spheres described in claim 8, wherein

said cooling means is a fluid tank made of an oil or an inert high-molecular liquid or an inert high-molecular steam or an inert gas.

11. A manufacturing method of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, wherein

a minute metallic sphere is formed by discharging a molten metal from an opening portion, and dividing said molten metal discharged from said opening portion into each predetermined volume.

12. A manufacturing method of minute metallic spheres described in claim 11, wherein

said molten metal is discharged from said opening portion by the own weight of said molten metal.

13. A manufacturing method of minute metallic spheres described in claim 11, wherein

said molten metal is discharged from said opening portion by applying a pressure to said molten metal.

14. A manufacturing method of minute metallic spheres described in claim 11, wherein

said molten metal divided is cooled to a temperature less than the melting point, and solidified into a sphere in the cooling process.

15. A manufacturing method of minute metallic spheres described in claim 11, wherein

said molten metal is measured into a predetermined quantity, and then said predetermined quantity of molten metal is discharged from said opening portion.

16. A manufacturing method of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, having

a step of heating and melting a metal to form a metallic sphere, and discharging the molten metal from an opening portion,

a step of dividing said molten metal discharged from said opening portion into each predetermined volume, and

a step of cooling said molten metal divided to a temperature less than the melting point to solidify.

17. A manufacturing method of minute metallic spheres described in claim 16, wherein

said molten metal is discharged from said opening portion by the own weight of said molten metal.

18. A manufacturing method of minute metallic spheres described in claim 16, wherein

said molten metal is discharged from said opening portion by applying a pressure to said molten metal.

19. A manufacturing method of minute metallic spheres described in claim 11, wherein

said molten metal divided is discharged in a fluid at a temperature less than the melting point.

20. A manufacturing method of minute metallic spheres described in claim 19, wherein

said fluid is an oil or an inert gas.

21. A manufacturing apparatus of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, comprising

a heating means for heating and melting a metal to form a metallic sphere,

a means for discharging the molten metal from a predetermined opening portion,

a division means for dividing said molten metal having passed through said opening portion, and

a cooling means for cooling said molten metal divided by said division means, to a temperature less than the melting point.

22. A manufacturing apparatus of minute metallic spheres described in claim 21, wherein

said cooling means is a fluid tank made of an oil or an inert high-molecular liquid or an inert high-molecular steam or an inert gas.

23. A manufacturing apparatus of minute metallic spheres described in claim 21, wherein

said molten metal is discharged from said opening portion by the own weight of said molten metal.

24. A manufacturing apparatus of minute metallic spheres described in claim 21, wherein

said molten metal is discharged from said opening portion by applying a pressure to said molten metal.

25. A manufacturing method of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, including

a step of heating and melting a metal to form a metallic sphere, and injecting the molten metal in a measurement means by pressurizing,

a step of cutting by rubbing the molten metal injected in the measurement means by a predetermined volume to measure, and

a step of discharging the measured molten metal from the measurement means by a fluid pressure, and cooling the molten metal to a temperature less than the melting point to solidify.

26. A manufacturing method of minute metallic spheres described in claim 25, wherein,

when the molten metal is injected, it is pressurized and supplied at a high pressure from one side of the measurement means, and the other side opposite to it is set to a low pressure.

27. A manufacturing method of minute metallic spheres described in claim 25, wherein

the molten metal injected in said measurement means is cut by rubbing by the predetermined volume by rotational action of said measurement means to measure.

28. A manufacturing method of minute metallic spheres described in claim 25, wherein

the molten metal in said measurement means is discharged and cooled in a fluid at a temperature less than the melting point, and solidified into a sphere in the cooling process.

29. A manufacturing apparatus of minute metallic spheres for manufacturing minute metallic spheres of a predetermined size, comprising

a heating means for heating and melting a metal to form a metallic sphere,

a metal supply means for pressurizing and supplying the molten metal molten by the heating means,

a measurement means supported so as to be rotatable relatively to said metal supply means, for measuring the injected molten metal into a predetermined volume by its rotational action, and

a cooling means for cooling said molten metal discharged from said measurement means, to a temperature less than the melting point.

30. A manufacturing apparatus of minute metallic spheres described in claim 29, wherein

said measurement means comprises a cylindrical rotational drum having a through hole in which the molten metal is injected, and measures the molten metal by slide rotational action in relation to said metal supply means.

31. A manufacturing apparatus of minute metallic spheres described in claim 30, wherein

said metal supply means has outer and inner blocks disposed outside and inside said measurement means, and, in relation to the measurement means sliding and rotating between these, pressurizes and supplies the molten metal to the through hole from the outer block side.

32. A manufacturing apparatus of minute metallic spheres described in claim 29, wherein

said metal supply means has an injection passage provided in said outer block, and a storage portion disposed in said inner block oppositely to said injection passage.

33. A manufacturing apparatus of minute metallic spheres described in claim 31, wherein

said inner block has a gas chamber for discharging the molten metal injected in the through hole, from the measurement means.

34. A manufacturing apparatus of minute metallic spheres having a measurement unit in an upper portion of an oil vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in an oil, wherein

it has one or a plurality of cooling means in the lower part of said measurement unit, and a lower portion of said oil vessel is cooled.

35. A manufacturing apparatus of minute metallic spheres described in claim 34, wherein

said cooling means is a cooling tube or a cooling jacket wound around said oil vessel in the lower part of said measurement unit.

36. A manufacturing method of minute metallic spheres having a measurement unit in an upper portion of an oil vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in an oil, wherein

one or a plurality of regions in the lower part of said oil vessel is cooled, and the oil in each region is set and kept at a predetermined temperature.

37. A manufacturing method of minute metallic spheres described in claim 36, wherein

the oil in said oil vessel is cooled by a cooling tube or a cooling jacket wound around said oil vessel in the lower part of said measurement unit.

38. A manufacturing apparatus of minute metallic spheres having a measurement unit in an upper portion of an oil vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in an oil, having

one or a plurality of moving-flow regulation means for physically regulating a convection of said

oil in the oil vessel in the lower part of said measurement unit.

39. A manufacturing method of minute metallic spheres described in claim 36, wherein

said moving-flow regulation means is a projecting piece projecting from an inner wall of said oil vessel.

40. A manufacturing method of minute metallic spheres having a measurement unit in an upper portion of an oil vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in an oil, wherein

a convection of the oil in the oil vessel is physically regulated in one or a plurality of portions in the lower part of said measurement unit, and the oil in each region regulated is set and kept at a predetermined temperature.

41. A manufacturing apparatus of minute metallic spheres having a measurement unit in an upper portion of an oil vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in an oil, having

a dispersion means for dispersing the molten metal, in the lower part of said measurement unit.

42. A manufacturing apparatus of minute metallic spheres described in claim 41, wherein,

as said dispersion means, it includes a bell-like member constructed so as to be able to oscillate and rotate.

43. A manufacturing apparatus of minute metallic spheres described in claim 41, wherein,

as said dispersion means, it includes a propeller stirrer.

44. A manufacturing apparatus of minute metallic spheres described in claim 41, wherein,

as said dispersion means, it includes a supersonic oscillator.

45. A manufacturing method of minute metallic spheres having a measurement unit in an upper portion of an oil vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in an oil, wherein,

in the lower part of said measurement unit, the molten metal discharged from the measurement unit, is dispersed.

46. A manufacturing apparatus of minute metallic spheres having a measurement unit in an upper portion of an oil vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in an oil, comprising

a molten metal supply apparatus for supplying a molten metal from which inclusion has been removed, to the measurement unit.

47. A manufacturing apparatus of minute metallic spheres described in claim 46, wherein

said molten metal supply apparatus is constructed so as to blow out an inert gas to said molten metal in a pot, and catch and remove inclusion in said molten metal by the inert gas.

48. A manufacturing apparatus of minute metallic spheres described in claim 47, wherein

said molten metal supply apparatus further comprises a filter.

49. A manufacturing apparatus of minute metallic spheres having a measurement unit in an upper portion of a vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in a cooling medium put in the vessel, wherein

said cooling medium comprises an inert high-molecular liquid, an inert high-molecular steam and an inert gas.

50. A manufacturing apparatus of minute metallic spheres described in claim 49, wherein

said cooling medium comprises an inert fluorine-type high-molecular liquid, and an inert fluorine-type high-molecular steam.

51. A manufacturing apparatus of minute metallic spheres described in claim 49, wherein

the specific gravity of said cooling medium is 1.2 or more.

52. A manufacturing apparatus of minute metallic spheres having a measurement unit in an upper portion of a vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in a cooling medium put in the vessel, wherein

said cooling medium comprises an oil, and an inert high-molecular liquid put in the lower part of the oil.

53. A manufacturing apparatus of minute metallic spheres described in claim 52, wherein

said cooling medium comprises an inert fluorine-type high-molecular liquid.

54. A manufacturing apparatus of minute metallic spheres described in claim 52, wherein

the specific gravity of said cooling medium is 1.2 or more.

55. A manufacturing apparatus of minute metallic spheres described in claim 52, wherein

it includes alcohol in said inert high-molecular liquid.

56. A manufacturing method of minute metallic spheres having a measurement unit in an upper portion of a vessel disposed vertically in which a cooling

medium is put, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in the cooling medium put in the vessel, wherein

an inert high-molecular liquid, an inert high-molecular steam and an inert gas are used as said cooling medium, and said molten metal is cooled by said cooling medium to solidify.

57. A manufacturing method of minute metallic spheres described in claim 56, wherein

cooling is performed using an inert fluorine-type high-molecular liquid as said inert high-molecular liquid.

58. A manufacturing method of minute metallic spheres described in claim 56, wherein

a liquid comprising said inert high-molecular liquid and an oil is used as said cooling medium, and,

after cooling by said oil is performed, cooling by said inert high-molecular liquid, an inert high-molecular steam and an inert gas are performed to solidify said molten metal.

59. A manufacturing apparatus of minute metallic spheres having a measurement unit in an upper portion of a vessel disposed vertically, for forming a minute metallic sphere by solidifying a molten metal discharged from this measurement unit, in a cooling medium put in the vessel, wherein

the viscosity of said cooling medium is kept into 2 cSt to 20 cSt at the temperature of 200°C at which said molten metal is melted, and

the dropping speed of said molten metal in said cooling medium is decreased by the viscosity of said cooling medium.

60. A manufacturing method of minute metallic spheres described in claim 60, wherein

said cooling medium is an oil, a mixture liquid in which a viscosity improver is added to an oil, or a mixture liquid in which a liquid of a high viscosity is added to an oil.

61. A manufacturing method of minute metallic spheres in which a measured molten metal is discharged in a vessel disposed vertically in which a cooling medium is put, and a minute metallic sphere is formed by solidifying said molten metal in said cooling medium, wherein

the viscosity of said cooling medium is kept into 2 cSt to 20 cSt at the temperature of 200°C at which said molten metal is melted, and

the dropping speed of said molten metal in said cooling medium is decreased by the viscosity of said cooling medium.

62. A manufacturing method of minute metallic spheres described in claim 61, wherein

an oil, a mixture liquid in which a viscosity improver is added to an oil, or a mixture liquid in

which a liquid of a high viscosity is added to an oil, is used as said cooling medium.

62. A semiconductor device in which a semiconductor chip and a substrate are electrically connected by minute metallic spheres of a predetermined size, wherein

said minute metallic spheres are formed by injecting a molten metal in a gauger of a predetermined volume to measure, and discharging the measured molten metal from the gauger to solidify.

63. A semiconductor device in which a semiconductor chip and a substrate are electrically connected by minute metallic spheres of a predetermined size, wherein

said minute metallic spheres are manufactured by a method including

a step of heating and melting a metal to form a metallic sphere, and injecting the molten metal in a gauger,

a step of cutting by rubbing the molten metal injected in said gauger by a predetermined volume to measure, and

a step of discharging the measured molten metal from the gauger, and cooling the molten metal to a temperature less than the melting point to solidify.